The Combination of Implanting with Revalor-200 and Feeding Zilmax Increases Subprimal Meat Yield of Fed Cows[1]

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Introduction

Mature cows are culled from herds for reasons such as poor performance and failure to rebreed. When these cows are removed from the herd, they are typically in thin condition and potentially can be fed to gain weight and increase income. Previous research has shown that feeding cull cows high-energy diets can increase carcass weight, fatness, and meat yield. Management practices of implanting and feeding β-adrenergic agonists, repartitioning agents that favor protein deposition at the expense of fat deposition, have been shown to further improve performance and carcass yields. As reported elsewhere in this publication, carcasses from concentrate-fed cows implanted with Revalor-200 (Intervet Inc., Millsboro, DE) and fed Zilmax (zilpaterol hydrochloride; Intervet Inc.) had more muscling as indicated by larger ribeye areas than carcasses from grass-fed cows and both implanted and non-implanted concentrate-fed cows. These carcasses potentially would have increased subprimal meat yields. Therefore, the objective of this study was to determine the effects of concentrate feeding, implanting, and feeding Zilmax on subprimal meat yield of mature cows fed for 70 days.

Experimental Procedures

Sixty cull cows were assigned to one of five treatments: (1) grass fed on pasture (G), (2) concentrate fed (C) a grain sorghum-sorghum silage diet, (3) concentrate fed and implanted (CI) with Revalor-200 (200 mg of trenbolone acetate and 20 mg of estradiol), (4) concentrate fed and fed Zilmax beginning on day 38 of the feeding period for 30 days followed by a 3-day withdrawal (CZ), and (5) concentrate fed, implanted, and fed Zilmax (CIZ). Cattle were fed for 70 days before harvest and carcass data collection. Implanted cows were implanted on day 0 in the right ear with Revalor-200 per the manufacturer's instructions. Zilmax was fed at the end of the feeding period for 30 days before a required 3-day withdrawal before slaughter. Seven cows were removed from the study because of health, pregnancy, or death. Removal was not related to treatment.

Cattle were humanely slaughtered at a commercial abattoir, where left sides were fabricated into boneless, closely-trimmed subprimal cuts according to guidelines of the North American Meat Processors Association (NAMP, 2006) approximately 72 hours postmortem. The ribeye roll from an 8-rib wholesale rib (modified NAMP #112); boneless, denuded brisket (modified NAMP #120); chuck roll (NAMP #116A); denuded chuck tender (modified NAMP #116B); and shoulder clod (NAMP #114) were removed from the forequarter. The wholesale round was further processed into the peeled knuckle (NAMP #167A); cap-off, top round (NAMP #169B); outside round (NAMP #171B); and eye of round (NAMP #171C), whereas the flank steak (NAMP #193) was removed

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from the wholesale flank. Lastly, the wholesale loin was broken down into a boneless, closely-trimmed strip loin (NAMP #180); denuded tenderloin (NAMP #190); boneless, closely-trimmed top sirloin butt (NAMP #184); and denuded bottom sirloin butt/tri-tip (NAMP #185D). Subprimal weights were recorded and subsequently divided by hot carcass weight (HCW) and initial body weight to calculate subprimal yields.

Data were analyzed as a completely randomized design by using the MIXED procedure of SAS. The model statement contained the respective response variables and treatment. Means were separated ($P<0.05$) by using the least significant difference procedure when the respective F-tests were significant ($P<0.05$).

Results and Discussion

Total chuck subprimals from carcasses of CIZ cows were heavier ($P<0.05$) than those from C and G cows (Table 1). In addition, total chuck subprimals from both CI and CZ cows were heavier ($P<0.05$) than total chuck subprimals from G cows, even though individual subprimal cut weights (shoulder clod, chuck tender, and chuck roll) were statistically similar ($P\geq0.18$) among treatments. Total weight of the modified ribeye roll was heavier ($P<0.05$) in all concentrate-fed cow groups than in G cows. Even though tenderloin weights were heavier ($P<0.05$) in carcasses from concentrate-fed than in those from G cows, total loin subprimal weights as well as weights of the strip loin, top sirloin butt, and bottom sirloin tri-tip did not differ ($P\geq0.16$) among feeding treatments. Total weights of round subprimal cuts from concentrate-fed cows were greater ($P<0.05$) than those from G cows. This difference can be largely attributed to heavier ($P<0.05$) top (inside) and bottom (outside) round weights from carcasses of the concentrate-fed cows than from carcasses of G cows. Conversely, there were no differences ($P\geq0.13$) in weights for eye of round, knuckle, or flank steaks among treatments. Carcasses from CIZ cows produced heavier ($P<0.05$) briskets than carcasses from C and G cows, and carcasses from CI and CZ cows produced heavier briskets ($P<0.05$) than carcasses from G cows.

Total subprimal cut weights from G cows were less ($P<0.05$) than those from concentrate-fed cows (Table 1). In addition, subprimal cut weights from CIZ cows were greater ($P<0.05$) than those from C cows. Total subprimal yields, as a proportion of HCW, did not differ ($P=0.13$) among treatments. However, expressed as a percentage of initial live weight, subprimal yields were lower ($P<0.05$) for G cows than for concentrate-fed cows. Among carcasses from concentrate-fed cows, yields of subprimal cuts from CIZ cows were greater ($P<0.05$) than those from CZ and C cows, and CI cows had greater ($P<0.05$) subprimal cut yields than C cows when expressed as a percentage of initial live weight.

Compared with G cows, concentrate-fed cows had carcasses with a greater total weight of boneless subprimals and a higher proportion of boneless subprimals when expressed as a percentage of initial live weight. Cows implanted and fed Zilmax had significantly greater total subprimal weights and a higher proportion of total subprimals when expressed as a percentage of initial live weight than cows fed concentrate only and numerically (not statistically) the greatest total weight and highest proportion of total subprimals of any treatments. Although not statistically significant, cows implanted and fed Zilmax also had the highest proportion of subprimals when expressed as a percentage of HCW.

Implications

Feeding a concentrate diet to cull cows offers an opportunity to increase the weight of boneless subprimals. To maximize the yield of these subprimals, concentrate-fed cows should be implanted and fed Zilmax during the later portion of the feeding period.

Table 1. Closely-trimmed subprimal weights per carcass side from cows fed for 70 days

	Treatment[1]						
Trait	CI	CIZ	CZ	C	G	SE	P-value
Hot carcass weight, lb	830[a]	840[a]	819[a]	804[a]	696[b]	25.6	<0.01
Chuck subprimals, lb	35.3[ab]	35.9[a]	34.8[ab]	32.2[bc]	29.5[c]	1.34	<0.01
Shoulder clod, lb	16.8	17.4	16.8	15.9	14.3	0.95	0.34
Chuck tender, lb	2.4	2.4	2.2	2.2	2.0	0.13	0.27
Chuck roll, lb	16.1	16.3	15.9	14.3	13.2	0.86	0.18
Ribeye roll, lb	12.3[a]	13.0[a]	11.9[a]	11.9[a]	10.1[b]	0.46	<0.01
Loin subprimals, lb	32.8	35.1	32.2	32.2	28.0	1.59	0.16
Tenderloin, lb	4.6[a]	4.9[a]	4.6[a]	4.4[a]	3.7[b]	0.18	<0.01
Strip loin, lb	12.3	13.0	11.9	12.3	10.6	0.64	0.21
Top sirloin, lb	14.6	15.2	14.1	14.3	12.3	0.84	0.26
Tri-tip, lb	1.5	1.7	1.5	1.4	1.1	0.18	0.24
Round subprimals, lb	43.4[a]	45.2[a]	44.1[a]	41.4[a]	36.2[b]	1.61	<0.01
Knuckle, lb	9.0	8.6	9.3	9.0	7.7	0.71	0.58
Inside round, lb	15.7[a]	16.8[a]	16.3[a]	15.0[a]	12.8[b]	0.68	<0.01
Outside round, lb	13.0[a]	13.9[a]	13.0[a]	12.3[a]	10.8[b]	0.51	<0.01
Eye of round, lb	5.7	6.2	5.5	5.1	4.4	0.35	0.13
Flank, lb	1.7	2.9	1.6	1.6	1.4	0.53	0.41
Brisket, lb	7.9[ab]	8.6[a]	7.5[ab]	7.1b[c]	5.5[c]	0.35	0.01
Total subprimals, lbs	133.6[ab]	140.4[a]	132.5[ab]	126.3[b]	109.8[c]	4.41	<0.01
Hot carcass weight[2], %	32.2	33.6	32.5	31.4	31.6	0.67	0.13
Initial live weight[3], %	23.9[ab]	25.3[a]	23.3[bc]	21.9[c]	19.5[d]	0.62	<0.01

1 CI = fed concentrate and implanted with Revalor-200; CIZ = fed concentrate, implanted with Revalor-200, and fed Zilmax for 30 days before slaughter; CZ = fed concentrate and fed Zilmax; C = fed concentrate; G = grazed native pasture.
2 100 × (2 × total subprimal weight)/hot carcass weight.
3 100 × (2 × total subprimal weight)/Initial live weight.
abcd Within a row, means without a common superscript letter differ (P<0.05).